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and seeks for as much more as it can discover, and recognizes the setting in which living, perceiving, and thinking go on. Naturalism in this sense is far from materialism;[10] for it regards the material world as the "natural basis" which finds its "ideal fulfilment" in the achievement of the goods which the structure of reality makes possible.[11] And thus from the slime of the sea-bed may arise beings who sing songs, build cathedrals, erect shrines to the saints, and dream of the kingdom of God. But the full meaning of naturalism is too much to attempt to define in a closing paragraph. It is perhaps enough if something has been said to reinforce Plato's contention that in vision the eye becomes a seeing eye, and the object becomes a white object.

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TRUTH AS CORRESPONDENCE: A RE-DEFINITION

THE purpose of this article is to show that by an accurate objective definition of the concepts involved it is possible to define truth in terms of correspondence, and at the same time avoid the well-known dialectical difficulties of the theory of error. Many attempts along this line have been made, but they have proved abortive. The advocates of what Joachim calls the coherence theory have found them altogether too easy to puncture. Granting that a true statement is one that corresponds with facts, they say, how are we to deal with false statements? We can not claim that they correspond to nothing at all, for this would imply that they were meaningless, which is not the case. And we can not say that they correspond with the wrong facts, for how can we determine their legitimate reference? In spite of the seeming finality of such objections, the correspondence theory of truth still survives. And it survives because of its obvious scientific common sense. But to a really striking degree epistemology has failed to put it on a sound logical basis. Propositions, assumptions, and other strange and doubtful entities have been invented to mediate between judgment and reality, and they are all conspicuously futile.

The correct solution is not by means of any of these ingenuities. It is found by taking an objective point of view in regard to the knowledge situation, and the factors entering into it. Our fundamental assumption is that knowledge is a function of reality. And our problem is so to define this relationship as to avoid the difficulties so often pointed out in connection with other correspondence theories of truth.

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[10] The word naturalism has not in this paper at all the same meaning as, for example, in Professor Perry's *Present Philosophical Tendencies*.

[11] These phrases are borrowed from Santayana's *Life of Reason*.

To begin with a study of the terms of the relation, what are we to understand by knowledge? Objectively considered, we may take knowledge to consist of speech-reactions. That is to say, it is a particular type of behavior. At first sight this may appear very paradoxical, but only because philosophy has paid little attention to the point. For it is by no means repugnant to the common sense of man. Humanity has inevitably perceived the necessity of inventing adequate means for keeping permanent records of speech-reactions. A page of writing is just as much a record of reactions as is the tracery on the smoked cylinder by which the subject of a psychological experiment shows his responses to the flashing of lights, the tones of bells or other stimuli. But the writing is an exceedingly complex and ingenious record of highly complex responses, whereas the tracery on the smoked surface is a relatively simple, two-dimensional affair. Thus the type of behavior known as language has evidently been given very great weight by the common consent of man, and the difficulty of regarding knowledge as language is sensibly diminished.

There are, however, two objections, one systematic, the other psychological, that must be met before we can proceed. In the first place it may be said that we are defining knowledge in terms of something that is not knowledge, and that this involves a reflexive fallacy. For if we say that all knowledge is speech, it may seem that we are making one of those assertions about all propositions that are forbidden by the Theory of Types. But this is not a case of defining one entity in terms of another. We do not have knowledge on the one hand and speech on the other. From the objective point of view we have nothing but speech. The whole material of logic itself is nothing but speech-reactions.

But, in the second place, it may be said that we are arguing far in advance of the known facts. It is by no manner of means established that all cognitive processes are essentially language-processes. This is true enough, but there is no lack of negative evidence in support of our contention. Within recent years extensive attempts have been made both in this country and in Europe to demonstrate the existence of so-called imageless thought. The fate of this research is quite instructive. In laboratories of marked sensationalist tendency, imageless thought was never discovered, while in laboratories of an anti-sensationalist turn, it was. Such an outcome can hardly fail to cast serious reflections on the whole method of introspective psychology. And specifically, it is relevant to our present discussion in that it suggests the impossibility of dealing with cognition in terms of impressions. Knowledge would seem to be an affair of reactions. And the only kind of behavior that can well be regarded as knowledge is speech. Of course when we come to the positive side of the question, and try to show that in every case of cognition a speech reaction is present, the difficulties are immense. Oftentimes the responses will be exceedingly subtle. There will be no evident motions of the vocal organs or the hands. There will perhaps be not even any palpable muscular innervations. The only changes may be in the cortex, where we have at present no means of observing them. But the decided weight of argument seems to be on the side of the supposition that from the objective point of view, cognition appears as language.

But must we not admit that types of behavior other than speech are cognitive in function—such for instance as pointing or drawing geometrical figures? When I reply to the question, "Where is the book?" by pointing, is this response not essentially knowledge from the objective point of view? Hardly, for it would seem very much more in accord with the probable psychological facts to suppose that the cognitive part of the proceeding would be found in some such suppressed, implicit speech-reaction as: "The book is where I am pointing." Again, it has been proposed that we try to communicate with hypothetical rational inhabitants of Mars by means of a figure of the Theorem of Pythagoras done large in canals on the Sahara desert. Would not the behaviors involved in planning and executing such a figure be essentially cognitive? Not so, for the essential meaning, the knowledge conveyed by such a figure, both to ourselves and to the Martians, would consist in the speech-reactions of which it would be the stimulus.

An apparently serious difficulty in regarding knowledge as consisting of speech reactions is found in the phenomena of qualitative perception. When I look at a red object, and see before me a patch of red, there seems to be something very direct and immediate in the situation. I seem to have what Bertrand Russell calls "knowledge by acquaintance." In such respects it appears, *prima facie*, that cognition is a matter of impression rather than reaction. But what actually happens? An ethereal vibration of a certain frequency impinges upon the retina, and presumably, a certain kind of stimulus travels up over the optic nerve. Does this constitute knowledge? It is difficult to say that it does. So far, it would appear, we have nothing at all but various metabolic changes. Of course the inner secret soul or consciousness of the subject may register something. But the outside observer knows nothing of all this. Still less does he know that the impression is one of redness. Indeed the very members of the subject himself are not aware of it at this stage. If we insist on stopping here, the whole business becomes a little secret between his cortex and his soul. Indeed, it is only when the stimulus goes across into response that it becomes anything at all. If the subject is a bull, and charges, we say that he is infuriated. If he is a man, and says "That is red" we say that he has knowledge. Even in the experimental psychology of sensation, where we might expect to find pure impressions if they exist anywhere, all the data are in the form of speech-reactions, the reports of the subjects.

Knowledge then, as a set of propositions or judgments, is something that possesses physical reality. It has a position in space and a duration in time. Certainly the mere geometrical relations of a piece of knowledge, a speech-reaction, are not of the first importance. Its structural correlations with the responding organism are the truly significant considerations. It is these which science must analyze. But to point out that a judgment has the same kind of ponderable reality as a chair is far from being a waste of time. It instantly banishes many of those vague and mystifying difficulties which have led epistemology into endless and futile dialectical mazes, and goes far towards clearing up the whole discussion as to the nature of truth.

This brings to our attention the second element in the cognitive situation, the object of knowledge. And here it would seem that we must inevitably take up the position which Bosanquet and the idealists have called "naïve realism." The object of knowledge will be the thing of physics, the thing, that is to say, which by possessing mass, momentum and so forth satisfies the requirements of, and is intelligible to physical science.

Bertrand Russell has several times discussed the relation of the things of physics to consciousness. In general, ignoring minor differences, his theory is that physical objects may be regarded as aggregations of sense-data. In this respect, of course, he is simply making a refinement upon the position of Hume. It is notable that this point of view admittedly culminates in solipsism, which of itself would be enough to suggest that it must be based on some radical error. For philosophers have almost always felt that solipsism is in the nature of a *reductio ad absurdum*, even when they have not seen their way clear to avoiding it.

The fundamental objection to defining physical things in terms of sense-data is that the existence of sense-data themselves is very doubtful. Of course it is allowed that sense-data are not found in a pure or uncombined condition, which, though it certainly raises serious difficulties, may not be fatal to Russell's theory. But this is by no means all. A thoroughgoing objective psychology denies that the patch of color of a given shape and size which is a constituent of the aggregate of data which makes up the thing according to Russell, is anything at all in and of itself. Unless the stimulus issues in response, unless it affects the behavior of the organism in some definite manner, we have no reason to believe that it exists as a stimulus at all. It is with responses that we are always concerned. Thus it is impossible to admit of sense-data as ultimate notions for epistemology. And the paradoxical issue of the attempt to reconstruct the things of physics as groupings of sense-data, the fact that it directly involves such a position as solipsism, is due to employing fictions as ultimates.

It would be very much better to regard the things of physics as classes of reactions. Indeed it might be suggested that this was the way out if the notion of sense-data proved untenable. But this would at once wreck the geometrical scheme by which Russell constructs the world of physics out of appearances. If we admit sense-data as he understands them, it is possible to suppose a relation of congruence between them. And in terms of this, and one or two other concepts, such as larger and smaller, and shielding, it is not difficult to derive direction and line. This done, we define a thing as the class of all lines (which themselves are classes of sense-data) which converge at a given locus. But with responses the case is altogether different. It is out of the question to set up such relations and to derive such a scheme in this case. There is a sense in which the thing might be regarded as the class of all responses in regard to it. But inasmuch as all such responses are occasioned by stimuli, we can never escape from duality. The conception of a class of responses may conceivably have a value, but the principle of Occam's razor can never get rid of entities called things, which are the causes of the stimuli issuing in these responses.

Thus it would seem that the adoption of an objective point of view not only results in giving up knowledge by acquaintance, but also commits us to a naïve realism in regard to the objects of knowledge. For those objects appear merely as the things of physics. Beyond this point analysis can not be pushed.

But it will be said that this completely ignores so-called abstract knowledge, which purports to deal not with ponderable individual things, but with universals. Universals, however, can always be regarded as classes of things. And Russell's theory of incomplete symbols shows that the class concepts are nothing but symbolic conveniences. In other words, we deal with universals by means of nominalism. Millenniums of adjustment have so refined human speech-reactions, that it is possible for us to use the convenience known as abstract thought.

The result of our discussion so far is that in the cognitive situation we have a relation set up between two classes of physical objects. On the one hand we have the specific object known as a speech-reaction; on the other, anything else, to which the speech-reaction somehow refers. Philosophy has usually dealt with the cognitive situation by revising its conception of the object of knowledge. The tendency has been towards a monism in favor of knowledge as something at any rate non-physical. The idealist has tried to show that the understanding makes nature. The empiricist has tried to show that nature may be regarded as made up of sense impressions. Common to both is the attempt to show that nature participates in the very essence of consciousness. Our own position here is the precise converse of this. It is a monism in favor of physical reality. It claims that knowledge itself is part of nature, that it is a specific phenomenon among phenomena. When we regard knowledge as a set of speech-reactions, the mysterious gap between mind and matter is evidently closed. It is true that there is still a duality between knowledge and the things known. But the crux of truth problem becomes the analysis of the relations between two physical things, between speech-reactions, and the things to which they refer.

Coming then to a study of the relation of knowledge to its object, it will be well to remind ourselves of the central difficulty with which our account must cope if it is to be successful. The discussion of correspondence theories of truth has definitely shown that their great weakness lies in their inability to explain how a particular piece of knowledge, a particular proposition, as it were, selects the particular fact in terms of which its truth value is to be determined. It has been claimed that apart from some such notion as the intention or internal meaning of a proposition, it is impossible to understand error. For if error is failure to correspond with something, we need some intention whose frustration shall constitute failure.

How then is every judgment uniquely related to the specific fact for which it stands? Let us begin with what have been called judgments of perception. Redefining this notion in our own terms, such judgments are those where the stimulus of the speech-reaction is that to which the judgment has reference. I see a colored patch, and respond by saying "that is red." I see my desk light burning, and the muscles of my vocal organs are innervated to make the assertion "the light is burning." In such cases the relation between the judgment and its object seems sufficiently clear. It is the relation of response to stimulus. The object is the cause of the judgment, the causal nexus taking an intricate path through the nervous ganglia. So far everything is simple enough. But as soon as we pass from judgments of this type we find a much more complex situation. Let us take two examples.

Suppose a friend of mine has assured me that he turned out my desk light. Then, when I enter the room and find it burning, my reaction may take the form of asserting "he's a liar." The stimulus comes in over a different cortical set, and issues in a different response. Or again, take the judgment "Julius Caesar crossed the Rubicon." Here the stimulus will probably be letters on a printed page. In both instances the immediate stimulus is in a sense irrelevant. How then is the judgment related to its object?

The general principle of explanation in both cases is the same. When I see the light burning and react with an assertion about my friend, the total stimulus is not merely the impact of the ethereal vibrations upon my retina. It is this impact and in addition the words of my friend. And my neural set is such that I react with regard to the latter but not the former. And when I assert that Caesar crossed the Rubicon, I am reproducing the original reaction made by observers two thousand years ago, who saw him splash through the stream and found in the sight a stimulus to the response, "He has crossed the Rubicon!" The situation is that of the psychological investigator who tabulates the results of experiments he has never personally made. He is dealing with responses whose stimuli have never gone across his own nervous system. But the whole significance of these responses is their relation to just these stimuli.

As has been pointed out, this is nothing but a very general explanation. But to demand very much more would not be reasonable. Little is known as yet of the means by which the nervous system makes selections from and performs integrations upon the vast number of stimuli which come in all the time. But psychology and neurology are decidedly justified in assuming that this enormously complex mechanism performs the task somehow. This assumption is the only hope of any sort of scientific explanation of our mental life, and it provides an excellent programme for research. It is the best we have. Without it we are reduced to sheer miracle. And for philosophy the advantage of dealing with the relation between knowledge and its objects along this line is that it keeps us in touch with the best scientific developments, and at least gives us the assurance that we are dealing with facts rather than fiction, even though our detailed knowledge of those facts may be very partial.

Thus to sum up, every judgment is uniquely related to its object by virtue of the fact that it is a response to which the object in question has been or is the stimulus. A judgment may not be immediately occasioned by the presence of the object to which it refers—for instance it may be occasioned by a printed record. This is due to the organization of our neural mechanism, which enables us to effect vast economies in living. But always we can push back to an ultimate stopping place where the stimulus and the speech-reaction are brought together in time and space.

This analysis makes it possible for us to define truth in terms of correspondence, and at the same time to give an account of error. Fundamental to this account is the notion of a normally functioning nervous system.

For a judgment is true when it is the response of a normal organism to a given stimulus. Suppose I say "Napoleon's tomb is in Paris." Let us assume that I have read these words somewhere. Pushing back along the chain of recorded responses of which the printed symbols that I saw were the last, I come finally to the place where the original observer, who started the whole series, stood. I am directed to a particular locus, and there I receive a stimulus that issues in the response, "Yes, Napoleon's tomb *is* in Paris." And this it is which constitutes the truth of the judgment. But suppose I read "Napoleon's tomb is in Berlin." Then I am directed to another locus, where I receive another stimulus, which issues in the response "No, Napoleon's tomb is not in Berlin." This means that the original judgment was false. The chain of recorded responses always directs us to some specific locus. This is the function of what has sometimes been called the intention or "internal meaning" of the judgment. And the notion of internal meaning has been used to wreck the whole correspondence theory. In and of itself, the notion seems to be quite inadmissable. The supposition that every judgment has ultimately two kinds of meaning is one to be avoided if at all possible. Such difficulties as these, and their accompanying dialectical objections to the correspondence theory of truth vanish as soon as we bring to light a mechanism which secures correlation between judgments and their objects.

It is impossible to arrive at a satisfactory account of the objective reference of judgments so long as we consider nothing but the judgments themselves. In and of themselves they are merely physical facts. They are no more and no less mysterious than so many chairs and tables. They are simply complexes of nervous discharge and muscular tension and relaxation. If we desire to understand their epistemological function, we must not consider them alone. To do so is to commit a fatal abstraction. We must take into consideration the entire structure in which they occur—the organic structure stimulated by contacts with objects outside itself, and responding to these contacts in a thousand various ways, some of which make up what we call knowledge.

In closing, it may be well to say a word as to the bearing of this point of view upon epistemology as a whole. Bertrand Russell is responsible for introducing into philosophy a technique which in a measure deserves to be called scientific. By applying the notions and methods of symbolic logic it is undeniably possible to get a very sharp definition of certain issues, and consequently to arrive at definite solutions of detailed problems. But the difference between modern science and philosophy is something more than a mere matter of technique. It is a difference in point of view. Science is objective, and philosophy, in large measure, is subjective. Russell's own distinction between knowledge by acquaintance and knowledge by description is essentially subjective. Philosophy can not become truly scientific till it becomes objective through and through. And a most important step in this direction is to adopt an objective point of view in studying the knowledge-situation.

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THE COMPLEX DILEMMA—A REJOINDER

I REGRET that absence from the country has prevented my giving earlier attention to Professor Brogan's criticism[1] of my article on the complex dilemma,[2] since it contains a serious misrepresentation.

The "exact meaning" of my criticism of the dilemma is said to be contained in the following dilemma: "If the minor and the conclusion are exclusive alternatives, the argument is fallacious; and if the minor is exclusive and the conclusion is non-exclusive then the argument is redundant. But either the minor and the conclusion

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[1] This JOURNAL, Vol. XVIII, pp. 566-7.

[2] *Ibid.*, pp. 244-6.